SEQUENCE LISTING

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<120> NICOTIANAMINE SYNTHASE AND GENE ENCODING THE SAME

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<140> 09/674,337
<141> 2000-10-30

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<151> 1999-04-30

<160> 22

<170> FastSEQ for Windows Version 3.0

<210> 1
<211> 328
<212> PRT
<213> Hordeum vulgare L.

<400> 1

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Met Asp Ala Gln Asn Lys Glu Val Ala Ala Leu Ile Glu Lys Ile Ala
 1               5                  10                  15
Gly Ile Gln Ala Ala Ile Ala Glu Leu Pro Ser Leu Ser Pro Ser Pro
            20                  25                  30
Glu Val Asp Arg Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
        35                  40                  45
Ser Pro Val Asp Val Thr Lys Leu Ser Pro Glu His Gln Arg Met Arg
    50                  55                  60
Glu Ala Leu Ile Arg Leu Cys Ser Ala Ala Glu Gly Lys Leu Glu Ala
65                  70                  75                  80
His Tyr Ala Asp Leu Leu Ala Thr Phe Asp Asn Pro Leu Asp His Leu
                85                  90                  95
Gly Leu Phe Pro Tyr Tyr Ser Asn Tyr Val Asn Leu Ser Arg Leu Glu
            100                 105                 110
Tyr Glu Leu Leu Ala Arg His Val Pro Gly Ile Ala Pro Ala Arg Val
        115                 120                 125
Ala Phe Val Gly Ser Gly Pro Leu Pro Phe Ser Ser Leu Val Leu Ala
    130                 135                 140
Ala His His Leu Pro Glu Thr Gln Phe Asp Asn Tyr Asp Leu Cys Gly
145                 150                 155                 160
Ala Ala Asn Glu Arg Ala Arg Lys Leu Phe Gly Ala Thr Ala Asp Gly
                165                 170                 175
Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
            180                 185                 190
Gln Glu Leu Gly Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
        195                 200                 205
Met Ala Ala Glu Glu Lys Ala Lys Val Ile Ala His Leu Gly Ala His
    210                 215                 220
Met Val Glu Gly Ala Ser Leu Val Val Arg Ser Ala Arg Pro Arg Gly
225                 230                 235                 240
```

```
Phe Leu Tyr Pro Ile Val Asp Pro Glu Asp Ile Arg Arg Gly Gly Phe
                245                 250                 255
Glu Val Leu Ala Val His His Pro Glu Gly Glu Val Ile Asn Ser Val
            260                 265                 270
Ile Val Ala Arg Lys Ala Val Glu Ala Gln Leu Ser Gly Pro Gln Asn
        275                 280                 285
Gly Asp Ala His Ala Arg Gly Ala Val Pro Leu Val Ser Pro Pro Cys
    290                 295                 300
Asn Phe Ser Thr Lys Met Glu Ala Ser Ala Leu Glu Lys Ser Glu Glu
305                 310                 315                 320
Leu Thr Ala Lys Glu Leu Ala Phe
                325
```

<210> 2
<211> 1295
<212> DNA
<213> Hordeum vulgare L.

<400> 2

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gcgttcagag gcttccagag ttcttccggt caccaagaag catttgatca taacatggat      60
gcccagaaca aggaggtcgc tgctctgatc gagaagatcg ccggtatcca ggccgccatc     120
gccgagctgc cgtcgctgag cccgtccccc gaggtcgaca ggctcttcac cgacctcgtc     180
acggcctgcg tcccgccgag ccccgtcgac gtgacgaagc tcagcccgga gcaccagagg     240
atgcgggagg ctctcatccg cttgtgctcc gccgccgagg ggaagctcga ggcgcactac     300
gccgacctgc tcgccacctt cgacaacccg ctcgaccacc tcggcctctt cccgtactac     360
agcaactacg tcaacctcag caggctggag tacgagctcc tggcgcgcca cgtgccgggc     420
atcgcgccgg cgcgcgtcgc cttcgtcggc tccggcccgc tgccgttcag ctcgctcgtc     480
ctcgccgcgc accacctgcc cgagacccag ttcgacaact acgacctgtg cggcgcggcc     540
aacgagcgcg ccaggaagct gttcggcgcg acggcggacg gcgtcggcgc gcgtatgtcg     600
ttccacacgg cggacgtcgc cgacctcacc caggagctcg gcgcctacga cgtggtcttc     660
ctcgccgcgc tcgtcggcat ggcagccgag gagaaggcca aggtgattgc ccacctgggc     720
gcgcacatgg tggaggggc gtccctggtc gtgcggagcg cacggccccg cggctttctt     780
taccccattg tcgacccgga ggacatcagg cggggtgggt tcgaggtgct ggccgtgcac     840
cacccggaag gtgaggtgat caactctgtc atcgtcgccc gtaaggccgt cgaagcgcag     900
ctcagtgggc cgcagaacgg agacgcgcac gcacggggcg cggtgccgtt ggtcagcccg     960
ccatgcaact tctccaccaa gatggaggcg agcgcgcttg agaagagcga ggagctgacc    1020
gccaaagagc tggccttttg attgaagagt gcgcgtggtc attctgtcgc ctgcgatcgt    1080
ggtaactttc ctactcgtgt gtgttttgat gtttgtgcct gtaagagtta tgcttccggc    1140
cttgtgctgt taatttacac gcgttacatg tagtacttgt atttatacct ggaataacgg    1200
tatgtaacat aaatattagt gggatttgaa gtgtaatgct aaataataag aaaacttgat    1260
gcagacattc aaaaaaaaaa aaaaaaaaaa aaaaa                               1295
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<210> 3
<211> 335
<212> PRT
<213> Hordeum vulgare L.

<400> 3

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Met Ala Ala Gln Asn Asn Gln Glu Val Asp Ala Leu Val Glu Lys Ile
 1               5                  10                  15
Thr Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser
            20                  25                  30
Pro Asp Val Asp Ala Leu Phe Thr Glu Leu Val Thr Ala Cys Val Pro
        35                  40                  45
Pro Ser Pro Val Asp Val Thr Lys Leu Gly Pro Glu Ala Gln Glu Met
    50                  55                  60
Arg Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu
```

```
65                  70                  75                  80
Ala His Tyr Ser Asp Met Leu Ala Ala Phe Asp Lys Pro Leu Asp His
                85                  90                  95
Leu Gly Met Phe Pro Tyr Tyr Asn Asn Tyr Ile Asn Leu Ser Lys Leu
            100                 105                 110
Glu Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Gly Tyr Arg Pro Ala
        115                 120                 125
Arg Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Phe Val
    130                 135                 140
Leu Ala Ala Arg His Leu Pro Asp Thr Met Phe Asp Asn Tyr Asp Leu
145                 150                 155                 160
Cys Gly Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Arg
                165                 170                 175
Asp Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu
            180                 185                 190
Ala Gly Glu Leu Ala Lys Tyr Asp Val Val Phe Leu Ala Ala Leu Val
        195                 200                 205
Gly Met Ala Ala Glu Asp Lys Ala Lys Val Ile Ala His Leu Gly Ala
    210                 215                 220
His Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala His Gly Ala
225                 230                 235                 240
Arg Gly Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly
                245                 250                 255
Gly Phe Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn
            260                 265                 270
Ser Val Ile Ile Ala Gln Lys Ser Lys Asp Val His Ala Asp Gly Leu
        275                 280                 285
Gly Ser Gly Arg Gly Ala Gly Gly Gln Tyr Ala Arg Gly Thr Val Pro
    290                 295                 300
Val Val Ser Pro Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr
305                 310                 315                 320
Gln Asn His Lys Arg Asp Glu Phe Ala Asn Ala Glu Val Ala Phe
                325                 330                 335
```

<210> 4
<211> 1342
<212> DNA
<213> Hordeum vulgare L.

<400> 4

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ctcctgtgcc tgtcctgagg taccaagaac accagtgaaa tggctgccca gaacaaccag      60
gaggtggatg ccctggtgga gaagatcacc gggctccatg ccgcaatcgc caagctgccg     120
tcgctcagcc catccccgga cgtcgacgcg ctcttcacgg agctggtcac ggcgtgcgtt     180
ccaccgagtc cagtggacgt gaccaagctc gggccggagg cgcaggagat gcgggagggc     240
ctcatccgcc tatgctccga ggccgagggg aagctggagg cgcactactc cgacatgctc     300
gccgccttcg acaagccgct ggatcacctc ggcatgttcc cctactacaa caactacatc     360
aacctcagca agctcgagta cgagctcctg gcccgctacg tgcctggcgg ctatcgcccg     420
gcgcgcgtcg cgttcatcgg ctccggcccg ctgccgttca gctcctttgt cctggccgcg     480
cgccacctgc ccgacaccat gttcgacaac tatgacctgt gcggtgcggc caacgatcgc     540
gccagcaagc tcttccgcgc ggatcgcgac gtgggtgccc gcatgtcgtt ccacacggcc     600
gacgtcgcgg acctcgccgg cgagctcgcc aagtacgacg ttgtcttcct ggccgcactc     660
gtcggcatgg ccgccgagga caaggcgaag gtgatcgcgc acctcggcgc acacatggca     720
gacggggcgg ccctcgtcgt gcgcagcgca cacggagcgc gcgggttcct gtacccgatc     780
gtcgaccccc aggacatcgg ccgaggcggg ttcgaggtgc tggccgtgtg ccatcccgac     840
gacgacgtgg tgaactccgt catcatcgca cagaagtcca aggacgtgca tgccgatgga     900
cttggcagcg ggcgtggtgc cggtggacag tacgcgcggg gcacggtgcc tgttgtcagc     960
cccccgtgca ggttcggcga gatggtggcg gacgtgaccc agaaccacaa gagagacgag    1020
```

```
tttgccaacg ccgaagtggc cttttgatcg ttcgctgcga gggtgtgcat ccatgatcca    1080
tccatacctc gttctgtgat tgcatcaagc ttgcaatcgt atgcatttca agtcacgtgt    1140
tgcttctatc caataatgta cgtgtggtgt ttacacgcga atgtcttgta gacctttgta    1200
tgtgtacaag tgaattttaa ttcacaagta catataatgg tcaccattga aaagatgttt    1260
agtgtgtgtt ttccaatata tgtttgtgta aggttcatca tctaataaaa tatgtttgga    1320
acccaaaaaa aaaaaaaaaa aa                                             1342
```

<210> 5
<211> 335
<212> PRT
<213> Hordeum vulgare L.

<400> 5

```
Met Ala Ala Gln Asn Asn Asn Lys Asp Val Ala Ala Leu Val Glu Lys
 1               5                  10                  15
Ile Thr Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro
            20                  25                  30
Ser Pro Asp Val Asp Ala Leu Phe Thr Glu Leu Val Thr Ala Cys Val
        35                  40                  45
Pro Pro Ser Pro Val Asp Val Thr Lys Leu Gly Pro Glu Ala Gln Glu
    50                  55                  60
Met Arg Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu
65                  70                  75                  80
Glu Ala His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp
                85                  90                  95
His Leu Gly Ile Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys
            100                 105                 110
Leu Glu Tyr Glu Leu Leu Ala Arg Tyr Val Arg Arg His Arg Pro Ala
        115                 120                 125
Arg Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Phe Val
    130                 135                 140
Leu Ala Ala Arg His Leu Pro Asp Thr Met Phe Asp Asn Tyr Asp Leu
145                 150                 155                 160
Cys Gly Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Thr
                165                 170                 175
Asp Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu
            180                 185                 190
Ala Ser Glu Leu Ala Lys Tyr Asp Val Val Phe Leu Ala Ala Leu Val
        195                 200                 205
Gly Met Ala Ala Glu Asp Lys Ala Lys Val Ile Ala His Leu Gly Ala
    210                 215                 220
His Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala His Gly Ala
225                 230                 235                 240
Arg Gly Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly
                245                 250                 255
Gly Phe Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn
            260                 265                 270
Ser Val Ile Ile Ala Gln Lys Ser Lys Glu Val His Ala Asp Gly Leu
        275                 280                 285
Gly Ser Ala Arg Gly Ala Gly Arg Gln Tyr Ala Arg Gly Thr Val Pro
    290                 295                 300
Val Val Ser Pro Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr
305                 310                 315                 320
Gln Asn His Lys Arg Asp Glu Phe Ala Asn Ala Glu Val Ala Phe
                325                 330                 335
```

<210> 6

<211> 1314
<212> DNA
<213> Hordeum vulgare L.

<400> 6

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ctacttcact cacactagtg cccagaaaga aggctgcaat ggctgcccag aacaacaaca      60
aggatgtcgc tgccctggtg gagaagatca ccgggctcca cgccgccatc gccaagctgc     120
cgtcgctcag cccatccccg gacgtcgacg cgctcttcac cgagctggtc acggcgtgcg     180
ttcccccgag ccccgtggac gtgaccaagc tcggccccga ggcgcaggag atgcgggagg     240
gcctcatccg cctctgctcc gaggccgagg ggaagctgga ggcgcactac tccgacatgc     300
tcgccgcctt cgacaacccg ctggatcacc tcggcatctt cccctactac agcaactaca     360
tcaacctcag caagctggag tacgagctcc tggcacgcta cgtccggcgg catcgcccgg     420
cccgcgtcgc gttcatcggc tccggcccgc tgccgttcag ctcctttgtc ctggccgcgc     480
gccacctgcc cgacaccatg tttgacaact acgacctttg cggcgcggcc aacgatcgcg     540
ccagcaagct cttccgcgcg gacacggacg tgggtgcccg catgtcgttc cacacggccg     600
acgtcgcgga cctcgccagc gagctcgcca agtacgacgt cgtcttcctg gccgcgctcg     660
tcggcatggc cgccgaggac aaggccaagg tgatcgcgca cctcggcgca cacatggcag     720
acggggcggc cctcgtcgtg cgcagcgcac acggagcgcg cgggttcctg tacccgattg     780
tcgaccccca ggacatcggc cgcggcgggt tcgaggtgct ggccgtgtgc caccccgacg     840
acgacgtggt gaactccgtc atcatcgcac agaagtccaa ggaggtgcat gccgatggac     900
ttggcagcgc gcgtggtgcc ggtcgacagt acgcgcgcgg cacggtgccg gttgtcagcc     960
ccccgtgcag gttcggtgag atggtggcgg atgtgaccca gaaccacaag agagacgagt    1020
ttgccaacgc cgaagtggcc ttttgatcga tcgtcgccaa gggacaataa atgaacgtgg    1080
atgtggtagg gtaatttgcc tacctcgctg cttgatcgct tgcaatatgt gcacattttc    1140
ctactaccgc tgcttatgca tttcaagcca tgtgatgttg gtatccaata aagtatgtgt    1200
agggtttaca cgcaaatgtc tttacacctt gtacgtgtaa gtgttgacaa cgatgaattt    1260
cagttcacaa ttaataaata gtataatgga ttcaaaaaaa aaaaaaaaaa aaaa          1314
```

<210> 7
<211> 329
<212> PRT
<213> Hordeum vulgare L.

<400> 7

```
Met Asp Gly Gln Ser Glu Glu Val Asp Ala Leu Val Gln Lys Ile Thr
 1               5                  10                  15
Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser Pro
            20                  25                  30
Asp Val Asp Ala Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
        35                  40                  45
Ser Pro Val Asp Val Thr Lys Leu Ala Pro Glu Ala Gln Ala Met Arg
    50                  55                  60
Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu Ala
65                  70                  75                  80
His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp His Leu
                85                  90                  95
Gly Val Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys Leu Glu
            100                 105                 110
Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Arg His Arg Pro Ala Arg
        115                 120                 125
Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Tyr Val Leu
    130                 135                 140
Ala Ala Arg His Leu Pro Asp Thr Val Phe Asp Asn Tyr Asp Leu Cys
145                 150                 155                 160
Gly Ala Ala Asn Asp Arg Ala Thr Arg Leu Phe Arg Ala Asp Lys Asp
                165                 170                 175
Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
```

```
            180                 185                 190
Asp Glu Leu Ala Thr Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
        195                 200                 205
Met Ala Ala Glu Asp Lys Ala Lys Val Ile Ala His Leu Gly Ala His
    210                 215                 220
Met Ala Asp Gly Ala Ala Leu Val Ala Arg His Gly Ala Arg Gly Phe
225                 230                 235                 240
Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly Gly Phe Glu
                245                 250                 255
Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn Ser Val Ile
            260                 265                 270
Ile Ala Gln Lys Ser Asn Asp Val His Glu Tyr Gly Leu Gly Ser Gly
        275                 280                 285
Arg Gly Gly Arg Tyr Ala Arg Gly Thr Val Val Pro Val Val Ser Pro
    290                 295                 300
Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr Gln Lys Arg Glu
305                 310                 315                 320
Glu Phe Ala Asn Ala Glu Val Ala Phe
                325
```

<210> 8
<211> 1249
<212> DNA
<213> Hordeum vulgare L.

<400> 8

```
ccactaccga ctaccgtagt accgtgcctc agagctcatc actggtcagg taccaagaag      60
acataaaaat ggacggccag agcgaggagg tcgacgccct tgtccagaag atcaccggcc     120
tccacgccgc catcgccaag ctgccctcgc tcagcccgtc cccggacgtc gacgcgctct     180
tcaccgacct ggtcaccgcg tgcgtgcccc cgagccccgt ggacgtgacc aagctcgccc     240
cggaggcgca ggcgatgcgg gagggcctca tccgcctctg ctccgaggcc gagggcaagc     300
tggaggcgca ctactccgac atgctcgccg ccttcgacaa cccgctcgac cacctcggcg     360
tcttccccta ctacagcaac tacatcaacc tcagcaagct tgagtacgag ctcctcgcgc     420
gctacgtgcc cggcaggcat cgcccggccc gcgtcgcctt catcggctcc ggcccgctgc     480
cgttcagctc ctacgtcctc gccgcgcgcc acctgcccga caccgtgttc gacaactacg     540
acctgtgcgg cgcggccaac gaccgcgcga ccaggctgtt ccgcgcggac aaggacgtcg     600
gcgcccgcat gtcgttccac accgccgacg tcgcggacct caccgacgag ctcgctacgt     660
acgacgtcgt cttcctggcc gcgctcgtgg gcatggccgc cgaggacaag gccaaggtga     720
tcgcgcacct tggcgcgcac atggcggacg gggcggccct cgttgcgcgg cacggcgcgc     780
gtgggttcct ctacccgatc gtcgatcccc aggacatcgg tcgaggcggg ttcgaggtgc     840
tcgccgtgtg tcaccccgac gacgacgtgg tgaactccgt catcatcgca caaaagagca     900
acgacgtgca cgagtatgga cttggcagcg ggcgtggtgg acggtacgcg cgaggcacgg     960
tggtgccggt ggtcagccca ccctgcaggt tcggcgagat ggtggcagac gtgacccaga    1020
agagagagga gtttgccaac gcggaagtgg ccttctgatt gctgctgaat cgcttgtgat    1080
cgtacgtggt aatttttcta ctactcctcc tcctaccacc acctatcacc tatgtatgca    1140
tttcaagtcg tgtgttgttt gtatccaata atgtaagtga gatgtttaca cgcgcaaaaa    1200
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaa               1249
```

<210> 9
<211> 282
<212> PRT
<213> Hordeum vulgare L.

<400> 9

```
Met Glu Ala Glu Asn Gly Glu Val Ala Ala Leu Val Glu Lys Ile Thr
 1               5                  10                  15
Gly Leu His Ala Ala Ile Ser Lys Leu Pro Ala Leu Ser Pro Ser Pro
```

```
            20                  25                  30
Gln Val Asp Ala Leu Phe Thr Glu Leu Val Ala Ala Cys Val Pro Ser
        35                  40                  45
Ser Pro Val Asp Val Thr Lys Leu Gly Pro Glu Ala Gln Glu Met Arg
    50                  55                  60
Gln Asp Leu Ile Arg Leu Cys Ser Ala Ala Glu Gly Leu Leu Glu Ala
65                  70                  75                  80
His Tyr Ser Asp Met Leu Thr Ala Leu Asp Ser Pro Leu Asp His Leu
                85                  90                  95
Gly Arg Phe Pro Tyr Phe Asp Asn Tyr Val Asn Leu Ser Lys Leu Glu
            100                 105                 110
His Asp Leu Leu Ala Gly His Val Ala Ala Pro Ala Arg Val Ala Phe
        115                 120                 125
Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Leu Phe Leu Ala Thr Tyr
    130                 135                 140
His Leu Pro Asp Thr Arg Phe Asp Asn Tyr Asp Arg Cys Ser Val Ala
145                 150                 155                 160
Asn Gly Arg Ala Met Lys Leu Val Gly Ala Ala Asp Glu Gly Val Arg
                165                 170                 175
Ser Arg Met Ala Phe His Thr Ala Glu Val Thr Asp Leu Thr Ala Glu
            180                 185                 190
Leu Gly Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly Met Thr
        195                 200                 205
Ser Lys Glu Lys Ala Asp Ala Ile Ala His Leu Gly Lys His Met Ala
    210                 215                 220
Asp Gly Ala Val Leu Val Arg Glu Ala Leu His Gly Ala Arg Ala Phe
225                 230                 235                 240
Leu Tyr Pro Val Val Glu Leu Asp Asp Val Gly Arg Gly Gly Phe Gln
                245                 250                 255
Val Leu Ala Val His His Pro Ala Gly Asp Glu Val Phe Asn Ser Phe
            260                 265                 270
Ile Val Ala Arg Lys Val Lys Met Ser Ala
        275                 280
```

<210> 10
<211> 1044
<212> DNA
<213> Hordeum vulgare L.

<400> 10

```
gtgacatgga ggccgaaaac ggcgaggtgg ctgctctggt cgagaagatc accggtctcc      60
acgccgccat ctccaagctc ccggcactaa gcccgtctcc tcaagtcgac gcgctcttca     120
ccgagctggt tgcggcgtgc gtcccatcaa gcccggtgga cgtgaccaag ctcggcccgg     180
aggcgcagga gatgcggcag gacctcatcc gtctctgctc ggccgccgag gggctgctcg     240
aggcgcacta ctccgacatg ctcaccgcgt tggacagccc gctcgaccac ctcggccgct     300
tcccttactt cgacaactac gtcaacctca gcaagctcga gcacgatctt ctggcaggtc     360
acgtggcggc cccggcccgc gtggcgttca tcgggtcggg gccactgccg ttcagctcgc     420
tcttccttgc gacgtaccac ctgccggaca cccggttcga caactacgac cggtgcagcg     480
tggcgaatgg ccgggcgatg aagctggtcg gcgcggcgga cgagggcgtg cgatcacgca     540
tggcgttcca cacggccgaa gtcacggacc tcacggctga gctcggcgct tacgacgtgg     600
tcttcctggc cgcgctcgtg ggaatgacgt ccaaggagaa ggccgacgcc atagcgcact     660
tggggaagca catggcagat ggggcggtgc tcgtgcgcga agcgctgcac ggggcgcgag     720
cgttcctgta tcctgtcgtg gagctggacg atgtcgggcg tggtgggttc caagtgctgg     780
ccgtgcacca ccctgcaggc gatgaggtgt tcaactcatt catagttgcc cggaaggtga     840
aaatgagtgc ttaaattaag aaaagggtga gcctgtctgc ttgtgcaaat ggtgtctcac     900
attgataata accagatgat accctgcaca ttgatggggg tactgcagta tgtttcaatg     960
aggtctggtt gtatcaaata tgagtatttg gcttaataat atcagcgaat atgtttcgat    1020
```

taaaaaaaaa aaaaaaaaaa aaaa 1044

<210> 11
<211> 328
<212> PRT
<213> Hordeum vulgare L.

<400> 11

```
Met Asp Ala Gln Asn Lys Glu Val Asp Ala Leu Val Gln Lys Ile Thr
 1               5                  10                  15
Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser Pro
            20                  25                  30
Asp Val Asp Ala Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
        35                  40                  45
Ser Pro Val Asp Val Thr Lys Leu Gly Ser Glu Ala Gln Glu Met Arg
    50                  55                  60
Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu Ala
65                  70                  75                  80
His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp His Leu
                85                  90                  95
Gly Met Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys Leu Glu
            100                 105                 110
Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Gly Ile Ala Arg Pro Ala
        115                 120                 125
Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Tyr Val Leu
    130                 135                 140
Ala Ala Arg His Leu Pro Asp Ala Met Phe Asp Asn Tyr Asp Leu Cys
145                 150                 155                 160
Ser Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Lys Asp
                165                 170                 175
Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
            180                 185                 190
Arg Glu Leu Ala Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
        195                 200                 205
Met Ala Ala Glu Asp Lys Ala Lys Val Ile Pro His Leu Gly Ala His
    210                 215                 220
Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala Gln Ala Arg Gly
225                 230                 235                 240
Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly Gly Phe
                245                 250                 255
Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn Ser Val
            260                 265                 270
Ile Ile Ala His Lys Ser Lys Asp Val His Ala Asn Glu Arg Pro Asn
        275                 280                 285
Gly Arg Gly Gly Gln Tyr Arg Gly Ala Val Pro Val Val Ser Pro Pro
    290                 295                 300
Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr His Lys Arg Glu Glu
305                 310                 315                 320
Phe Thr Asn Ala Glu Val Ala Phe
                325
```

<210> 12
<211> 1352
<212> DNA
<213> Hordeum vulgare L.

<400> 12

```
ctccacttcg ctcctgtgcc tcaggtagcc acaacataca gtattaaaat ggatgcccag      60
aacaaggagg ttgatgccct ggtccagaag atcaccggcc tccacgccgc catcgccaag     120
ctgccgtccc tcagcccatc acccgacgtc gacgcgctct tcaccgacct ggtcaccgcg     180
tgcgtccccc cgagccccgt ggacgtgacc aagctcgggt cggaggcgca ggagatgcgg     240
gagggcctca tccgcctctg ctccgaggcc gaggggaagc tggaggcgca ctactccgac     300
atgctggccg ccttcgacaa cccgctcgac cacctcggca tgttccccta ctacagcaac     360
tacatcaacc tcagcaagct ggagtacgag ctcctggcgc gctacgtgcc gggcggcatc     420
gcccggcccg ctgtcgcgtt catcggctcc ggcccgctgc cgttcagctc ctacgtcctc     480
gccgctcgcc acctgcccga cgccatgttc gacaactacg acctgtgtag cgcggccaac     540
gaccgtgcga gcaagctgtt ccgcgcggac aaggacgtgg gcgcccgcat gtctttccac     600
accgccgacg tagcggacct cacccgcgag ctcgccgcgt acgacgtcgt cttcctggcc     660
gcgctcgtgg gcatggctgc cgaggacaag gccaaggtga ttccgcacct cggcgcgcac     720
atggcggacg gggcggccct cgtcgtgcgc agtgcgcagg cacgtgggtt cctctacccg     780
atcgtcgatc cccaggacat cggtcgaggc gggtttgagg tgctggccgt gtgtcacccc     840
gacgatgacg tggtgaactc cgtcatcatc gcacacaagt ccaaggacgt gcatgccaat     900
gaacgtccca acgggcgtgg tggacagtac cggggcgcgg taccggtggt cagcccgccg     960
tgcaggttcg gtgagatggt ggcggacgtg acccacaaga gagaggagtt caccaacgcg    1020
gaagtggcct tctgatcgtt gcgagggaat gaaaatgaag gtggacgtgt gtggtcagca    1080
tccatacgtg gctgcctgct tcatcgcttg caatcgtact actacctacc tatgcagttc    1140
aagtcatgtg ttgtcaatgt aagtgtgatg tttacactag tctatgaaag gcagggcaga    1200
cgagggtagt gtgccaagta acagtgtgtc attataggtg taagtgttga gaataagacc    1260
atttttgttc acaaatagta tgatgtaatc ggtgtcatat tcgtattgag tacatttgtc    1320
aagttggttg ctaaaaaaaa aaaaaaaaaa aa                                  1352
```

<210> 13
<211> 329
<212> PRT
<213> Hordeum vulgare L.

<400> 13

```
Met Asp Ala Gln Ser Lys Glu Val Asp Ala Leu Val Gln Lys Ile Thr
 1               5                  10                  15
Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser Pro
            20                  25                  30
Asp Val Asp Ala Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
        35                  40                  45
Ser Pro Val Asp Val Thr Lys Leu Ala Pro Glu Ala Gln Ala Met Arg
    50                  55                  60
Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu Ala
65                  70                  75                  80
His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp His Leu
                85                  90                  95
Gly Val Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys Leu Glu
            100                 105                 110
Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Gly Ile Ala Pro Ala Arg
        115                 120                 125
Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Tyr Val Leu
    130                 135                 140
Ala Ala Arg His Leu Pro Asp Thr Val Phe Asp Asn Tyr Val Pro Val
145                 150                 155                 160
Arg Ala Ala Asn Asp Arg Ala Thr Arg Leu Phe Arg Ala Asp Lys Asp
                165                 170                 175
Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
            180                 185                 190
Asp Glu Leu Ala Thr Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
        195                 200                 205
Met Ala Ala Glu Asp Lys Gly Gln Gly Asp Pro His Leu Gly Ala His
```

```
    210                 215                 220
Met Ala Asp Gly Ala Ala Leu Val Arg Ser Ala His Gly Ala Arg Gly
225                 230                 235                 240
Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly Gly Phe
                245                 250                 255
Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn Ser Val
            260                 265                 270
Ile Ile Ala Gln Lys Ser Lys Asp Met Phe Ala Asn Gly Pro Arg Asn
        275                 280                 285
Gly Cys Gly Gly Arg Tyr Ala Arg Gly Thr Val Pro Val Val Ser Pro
    290                 295                 300
Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr Gln Lys Arg Glu
305                 310                 315                 320
Glu Phe Ala Lys Ala Glu Val Ala Phe
                325
```

<210> 14
<211> 1371
<212> DNA
<213> Hordeum vulgare L.

<220>
<221> misc_feature
<222> (8)...(8)
<223> n = t, c, a or g

<400> 14

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ggagcggnac gcgtggcgga ggtgggcact accgtagtac cgtgcctcag agctcatcac      60
tggtcaggta ccaagaagac ataaaaatgg acgcccagag caaggaggtc gacgcccttg     120
tccagaagat caccggcctc cacgccgcca tcgccaagct gccctcgctc agcccgtccc     180
cggacgtcga cgcgctcttc accgacctgg tcaccgcgtg cgtgcccccg agccccgtgg     240
acgtgaccaa gctcgccccg gaggcgcagg cgatgcggga gggcctcatc cgcctctgct     300
ccgaggccga gggcaagctg gaggcgcact actccgacat gctcgccgcc ttcgacaacc     360
cgctcgacca cctcggcgtc ttcccctact acagcaacta catcaacctc agcaagctcg     420
agtacgagct cctcgcgcgc tacgtgcccg gcggcatcgc cccggcccgc gtcgccttca     480
tcggctccgg cccgctcccg ttcagctcct acgtcctcgc cgcgcgccac ctgcccgaca     540
ccgtgttcga caactacgta cctgtgcgcg cggccaacga ccgcgcgacc aggctgttcc     600
gcgcggacaa ggacgtcggc gcccgcatgt cgttccacac cgccgacgtc gcggacctca     660
ccgacgagct cgctacgtac gacgtcgtct tcctggccgc gctcgtgggc atggccgccg     720
aggacaaggg ccaaggtgat ccgcaccttg gcgcgcacat ggcggacggg gcggccctcg     780
tccgcagcgc gcacggggcg cgtgggttcc tctacccgat cgtcgatccc caagacattg     840
gtcgaggcgg gttcgaggtg ctcgccgtgt gtcaccccga cgacgacgtg gtgaactccg     900
tcatcatcgc gcagaagtct aaggacatgt ttgccaatgg acctcgcaac gggtgtggtg     960
gacggtacgc gcgaggcacg gtgccggtgg tcagcccgcc ctgcaggttc ggcgagatgg    1020
tggcagacgt gacccagaag agagaggagt ttgccaaggc ggaagtggcc ttctgattgc    1080
tgcgaggtca ccatccgtat gccgctgcta cctttcaata tcttgcaatc gtaggtggcg    1140
attttcctac tcttgttacg acctttcaaa tcatatgttg tttgtaccca ataatgtaag    1200
tgtgttgctt acacgcgcat gtcttgtaca ctcggtctct agaaggcagg gcagatcaag    1260
agactgtgca aaggaaaaga aatgtgtgtt gttgtaggtg tatgagttgg gagtaagatg    1320
attctagttc acaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa a             1371
```

<210> 15
<211> 324
<212> PRT
<213> Oryza sativa L.

<400> 15

```
Met Glu Ala Gln Asn Gln Glu Val Ala Ala Leu Val Glu Lys Ala Gly
 1               5                  10                  15
Leu His Ala Ala Ser Lys Leu Pro Ser Leu Ser Pro Ser Ala Glu Val
            20                  25                  30
Asp Ala Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Ala Ser Pro
        35                  40                  45
Val Asp Val Ala Lys Leu Gly Pro Glu Ala Gln Ala Met Arg Glu Glu
    50                  55                  60
Leu Arg Leu Cys Ser Ala Ala Glu Gly His Leu Glu Ala His Tyr Ala
65                  70                  75                  80
Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp His Leu Ala Arg Phe
                85                  90                  95
Pro Tyr Tyr Gly Asn Tyr Val Asn Leu Ser Lys Leu Glu Tyr Asp Leu
            100                 105                 110
Leu Val Arg Tyr Val Pro Gly Ala Pro Thr Arg Val Ala Phe Val Gly
        115                 120                 125
Ser Gly Pro Leu Pro Phe Ser Ser Leu Val Leu Ala Ala His His Leu
    130                 135                 140
Pro Asp Ala Val Phe Asp Asn Tyr Asp Arg Cys Gly Ala Ala Asn Glu
145                 150                 155                 160
Arg Ala Arg Arg Leu Phe Arg Gly Ala Asp Glu Gly Leu Gly Ala Arg
                165                 170                 175
Met Ala Phe His Thr Ala Asp Val Ala Thr Leu Thr Gly Glu Leu Gly
            180                 185                 190
Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly Met Ala Ala Glu
        195                 200                 205
Glu Lys Ala Gly Val Ala His Leu Gly Ala His Met Ala Asp Gly Ala
    210                 215                 220
Ala Leu Val Val Arg Thr Ala His Gly Ala Arg Gly Phe Leu Tyr Pro
225                 230                 235                 240
Val Asp Pro Glu Asp Val Arg Arg Gly Gly Phe Asp Val Leu Ala Val
                245                 250                 255
Cys His Pro Glu Asp Glu Val Asn Ser Val Val Ala Arg Lys Val Gly
            260                 265                 270
Ala Ala Ala Ala Ala Ala Ala Ala Arg Arg Asp Glu Leu Ala Asp Ser
        275                 280                 285
Arg Gly Val Val Leu Pro Val Val Gly Pro Pro Ser Thr Cys Cys Lys
    290                 295                 300
Val Glu Ala Ser Ala Val Glu Lys Ala Glu Glu Phe Ala Ala Asn Lys
305                 310                 315                 320
Glu Leu Ser Val
```

<210> 16
<211> 1372
<212> DNA
<213> Oryza sativa L.

<400> 16

```
ctccatttgg ttgtcatttt caactataat ccaccacaac tcgtgcaaca tcagctcact      60
cgtgttccca accgcgacaa agcttcacag atggaggctc agaaccaaga ggtcgctgcc     120
ctggtcgaga agatcgccgg cctccacgcc gccatctcca agctgccgtc gctgagccca     180
tccgccgagg tggacgcgct cttcaccgac ctcgtcacgg cgtgcgtccc ggcgagcccc     240
gtcgacgtgg ccaagctcgg cccggaggcg caggcgatgc gggaggagct catccgcctc     300
tgctccgccg ccgagggcca cctcgaggcg cactacgccg acatgctcgc cgccttcgac     360
aacccgctcg accacctcgc ccgcttcccg tactacggca actacgtcaa cctgagcaag     420
ctggagtacg acctcctcgt ccgctacgtc cccggcattg cccccacccg cgtcgccttc     480
```

```
gtcgggtcgg gcccgctgcc gttcagctcc ctcgtgctcg ctgcgcacca cctgccggac     540
gcggtgttcg acaactacga ccggtgcggc gcggccaacg agcgggcgag gaggctgttc     600
cgcggcgccg acgagggcct cggcgcgcgc atggcgttcc acaccgccga cgtggcgacc     660
ctgacggggg agctcggcgc gtacgacgtc gtgttcctgg cggcgctcgt gggcatggcg     720
gccgaggaga aggccggggt gatcgcgcac ctgggcgcgc acatggcgga cggcgcggcg     780
ctcgtcgtgc ggacggcgca cggggcgcgc gggttcctgt acccgatcgt cgatcccgag     840
gacgtcaggc gtggcgggtt cgacgttctg gcggtgtgcc acccggagga cgaggtgatc     900
aactccgtca tcgtcgcccg caaggtcggt gccgccgccg ccgccgccgc ggcgcgcaga     960
gacgagctcg cggactcgcg cggcgtggtt ctgccggtgg tcgggccgcc gtccacgtgc    1020
tgcaaggtgg aggcgagcgc ggttgagaag gcagaagagt ttgccgccaa caaggagctg    1080
tccgtctaac agccggacga tcgaaaggcg cactatatta tggcaataaa tcatttgatt    1140
atacttatgc tgcatttgcg aagctaaggt atactatgca agccatatgt ttgtgttcgt    1200
acgtgttgtt tgggacgtac agttgtgttg ttgtacgtcg tgaagtactg aagtgttcac    1260
agtagatcac aagttcacag caatcaatga ggaccctgta agccagtgta aacgaggaac    1320
atgccatctg tgtatgacag tgagaaatta tataagaaaa acattttgtg ac            1372
```

<210> 17
<211> 320
<212> PRT
<213> Arabidopsis thaliana

<400> 17

```
Met Ala Cys Gln Asn Asn Leu Val Val Lys Gln Ile Ile Asp Leu Tyr
 1               5                  10                  15
Asp Gln Ile Ser Lys Leu Lys Ser Leu Lys Pro Ser Lys Asn Val Asp
            20                  25                  30
Thr Leu Phe Gly Gln Leu Val Ser Thr Cys Leu Pro Thr Asp Thr Asn
        35                  40                  45
Ile Asp Val Thr Asn Met Cys Glu Glu Val Lys Asp Met Arg Ala Asn
    50                  55                  60
Leu Ile Lys Leu Cys Gly Glu Ala Glu Gly Tyr Leu Glu Gln His Phe
65                  70                  75                  80
Ser Thr Ile Leu Gly Ser Leu Gln Glu Asp Gln Asn Pro Leu Asp His
                85                  90                  95
Leu His Ile Phe Pro Tyr Tyr Ser Asn Tyr Leu Lys Leu Gly Lys Leu
            100                 105                 110
Glu Phe Asp Leu Leu Ser Gln His Ser Ser His Val Pro Thr Lys Ile
        115                 120                 125
Ala Phe Val Gly Ser Gly Pro Met Pro Leu Thr Ser Ile Val Leu Ala
    130                 135                 140
Lys Phe His Leu Pro Asn Thr Thr Phe His Asn Phe Asp Ile Asp Ser
145                 150                 155                 160
His Ala Asn Thr Leu Ala Ser Asn Leu Val Ser Arg Asp Pro Asp Leu
                165                 170                 175
Ser Lys Arg Met Ile Phe His Thr Thr Asp Val Leu Asn Ala Thr Glu
            180                 185                 190
Ala Leu Asp Gln Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly Met
        195                 200                 205
Asp Lys Glu Ser Lys Val Lys Ala Ile Glu His Leu Glu Lys His Met
    210                 215                 220
Ala Pro Gly Ala Val Leu Met Leu Arg Arg Ala His Ala Leu Arg Ala
225                 230                 235                 240
Phe Leu Tyr Pro Ile Val Asp Ser Ser Asp Leu Lys Gly Phe Gln Leu
                245                 250                 255
Leu Thr Ile Tyr His Pro Thr Asp Asp Val Val Asn Ser Val Val Ile
            260                 265                 270
Ala Arg Lys Leu Gly Gly Pro Thr Thr Pro Gly Val Asn Gly Thr Arg
```

```
        275                 280                 285
Gly Cys Met Phe Met Pro Cys Asn Cys Ser Lys Ile His Ala Ile Met
    290                 295                 300
Asn Asn Arg Gly Lys Lys Asn Met Ile Glu Glu Phe Ser Thr Ile Glu
305                 310                 315                 320
```

<210> 18
<211> 963
<212> DNA
<213> Arabidopsis thaliana

<400> 18

```
atggcttgcc aaaacaatct cgttgtgaag caaatcatcg acttgtacga ccaaatctca      60
aagctcaaga gcttaaaacc ttccaaaaat gtcgacactt tgttcggaca actcgtgtcc     120
acgtgcttac ccacggatac aaacatcgat gtcacaaata tgtgtgaaga agtcaaagac     180
atgagagcta atctcatcaa gctttgtggt gaagccgaag gttatttgga gcaacacttc     240
tccacaattt tgggatcttt acaagaagac caaaacccac ttgaccattt acacatcttt     300
ccttactact ccaactacct caagctaggc aagctcgagt tcgatctcct gagccaacac     360
tcaagccatg tccccaccaa gattgccttc gtgggttcgg gtccgatgcc tctcacatcc     420
atcgtattgg ccaagtttca cctccccaac acgacgttcc acaactttga catcgactca     480
cacgcaaaca cactcgcttc aaacctcgtc tctcgcgacc cggacctctc aaaacgcatg     540
atcttccaca caacggacgt actaaacgca accgaagccc ttgaccaata tgacgtcgtt     600
ttcttagcgg cgcttgtagg gatggacaaa gagtcaaagg tcaaagccat cgagcacttg     660
gagaaacaca tggctcctgg agctgttctt atgctaagga gggctcatgc tctcagagct     720
ttcttatatc caatcgttga ctcgtctgat ctcaaaggct ttcaactctt gaccatctat     780
catccaaccg atgacgtggt taactcggtt gtgatcgcac gtaagctcgg tggtccgacc     840
acgcccgggg ttaatggtac tcgtggatgc atgtttatgc cttgtaactg ctccaagatt     900
cacgcgatca tgaacaaccg tggtaagaag aatatgatcg aggagtttag taccatcgag     960
taa                                                                  963
```

<210> 19
<211> 320
<212> PRT
<213> Arabidopsis thaliana

<400> 19

```
Met Ala Cys Gln Asn Asn Leu Val Val Lys Gln Ile Met Asp Leu Tyr
 1               5                  10                  15
Asn Gln Ile Ser Asn Leu Glu Ser Leu Lys Pro Ser Lys Asn Val Asp
            20                  25                  30
Thr Leu Phe Arg Gln Leu Val Ser Thr Cys Leu Pro Thr Asp Thr Asn
        35                  40                  45
Ile Asp Val Thr Glu Ile His Asp Glu Lys Val Lys Asp Met Arg Ser
    50                  55                  60
His Leu Ile Lys Leu Cys Gly Glu Ala Glu Gly Tyr Leu Glu Gln His
65                  70                  75                  80
Phe Ser Ala Ile Leu Gly Ser Phe Glu Asp Asn Pro Leu Asn His Leu
                85                  90                  95
His Ile Phe Pro Tyr Tyr Asn Asn Tyr Leu Lys Leu Gly Lys Leu Glu
            100                 105                 110
Phe Asp Leu Leu Ser Gln His Thr Thr His Val Pro Thr Lys Val Ala
        115                 120                 125
Phe Ile Gly Ser Gly Pro Met Pro Leu Thr Ser Ile Val Leu Ala Lys
    130                 135                 140
Phe His Leu Pro Asn Thr Thr Phe His Asn Phe Asp Ile Asp Ser His
145                 150                 155                 160
Ala Asn Thr Leu Ala Ser Asn Leu Val Ser Arg Asp Ser Asp Leu Ser
```

```
                165                 170                 175
Lys Arg Met Ile Phe His Thr Thr Asp Val Leu Asn Ala Lys Glu Gly
            180                 185                 190
Leu Asp Gln Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly Met Asp
        195                 200                 205
Lys Glu Ser Lys Val Lys Ala Ile Glu His Leu Glu Lys His Met Ala
    210                 215                 220
Pro Gly Ala Val Val Met Leu Arg Ser Ala His Gly Leu Arg Ala Phe
225                 230                 235                 240
Leu Tyr Pro Ile Val Asp Ser Cys Asp Leu Lys Gly Phe Glu Val Leu
                245                 250                 255
Thr Ile Tyr His Pro Ser Asp Asp Val Val Asn Ser Val Val Ile Ala
            260                 265                 270
Arg Lys Leu Gly Gly Ser Asn Gly Ala Arg Gly Ser Gln Ile Gly Arg
        275                 280                 285
Cys Val Val Met Pro Cys Asn Cys Ser Lys Val His Ala Ile Leu Asn
    290                 295                 300
Asn Arg Gly Met Glu Lys Asn Leu Ile Glu Glu Phe Ser Ala Ile Glu
305                 310                 315                 320
```

<210> 20
<211> 963
<212> DNA
<213> Arabidopsis thaliana

<400> 20

```
atggcttgcc aaaacaatct cgttgtgaag caaatcatgg acttatacaa ccaaatctca      60
aacctcgaga gcttaaaacc atccaagaat gtcgacactt tgttcagaca acttgtgtcc     120
acgtgcttac caacggacac gaacatcgat gtcacagaga tacacgatga aaaagtcaaa     180
gacatgagat ctcatctcat caagctttgt ggtgaagccg aaggttattt agagcaacac     240
ttttcagcaa tcttaggctc ttttgaagac aaccctctaa accatttaca catcttcccc     300
tattacaaca actatctcaa actaggcaaa ctcgaattcg atctcctttc tcagcacaca     360
acccatgtcc cgaccaaagt cgcctttatt ggttccggtc cgatgccact tacttccatc     420
gtcttggcca agttccacct ccccaacaca acgttccaca acttcgacat cgactcacac     480
gccaacacac tcgcttcaaa cctcgtttct cgtgattctg acctttccaa acgcatgatt     540
ttccacacaa ctgatgtatt aaacgctaag gaggggttag accaatacga tgttgttttc     600
ttggcagctc ttgttgggat ggataaagag tcaaaggtca aagctattga gcatttagag     660
aagcatatgg cccctggagc tgtggtgatg ctaagaagtg ctcatggtct tagagctttc     720
ttgtatccaa tcgttgactc ttgtgatctt aaagggtttg aggtgttaac catttatcat     780
ccgtctgacg acgtggttaa ttcggtggtc atcgcacgta agcttggtgg ttcaaatgga     840
gctcgaggca gccagatcgg acggtgtgtg gttatgcctt gtaattgctc taaggtccac     900
gcgatcttga acaatcgtgg tatggagaag aatttgatcg aggagtttag tgccatcgag     960
taa                                                                  963
```

<210> 21
<211> 320
<212> PRT
<213> Arabidopsis thaliana

<400> 21

```
Met Gly Cys Gln Asp Glu Gln Leu Val Gln Thr Ile Cys Asp Leu Tyr
 1               5                  10                  15
Glu Lys Ile Ser Lys Leu Glu Ser Leu Lys Pro Ser Glu Asp Val Asn
            20                  25                  30
Ile Leu Phe Lys Gln Leu Val Ser Thr Cys Ile Pro Pro Asn Pro Asn
        35                  40                  45
Ile Asp Val Thr Lys Met Cys Asp Arg Val Gln Glu Ile Arg Leu Asn
```

```
    50                  55                  60
Leu Ile Lys Ile Cys Gly Leu Ala Glu Gly His Leu Glu Asn His Phe
65                  70                  75                  80
Ser Ser Ile Leu Thr Ser Tyr Gln Asp Asn Pro Leu His His Leu Asn
                85                  90                  95
Ile Phe Pro Tyr Tyr Asn Asn Tyr Leu Lys Leu Gly Lys Leu Glu Phe
            100                 105                 110
Asp Leu Leu Glu Gln Asn Leu Asn Gly Phe Val Pro Lys Ser Val Ala
        115                 120                 125
Phe Ile Gly Ser Gly Pro Leu Pro Leu Thr Ser Ile Val Leu Ala Ser
    130                 135                 140
Phe His Leu Lys Asp Thr Ile Phe His Asn Phe Asp Ile Asp Pro Ser
145                 150                 155                 160
Ala Asn Ser Leu Ala Ser Leu Leu Val Ser Ser Asp Pro Asp Ile Ser
                165                 170                 175
Gln Arg Met Phe Phe His Thr Val Asp Ile Met Asp Val Thr Glu Ser
            180                 185                 190
Leu Lys Ser Phe Asp Val Val Phe Leu Ala Ala Leu Val Gly Met Asn
        195                 200                 205
Lys Glu Glu Lys Val Lys Val Ile Glu His Leu Gln Lys His Met Ala
    210                 215                 220
Pro Gly Ala Val Leu Met Leu Arg Ser Ala His Gly Pro Arg Ala Phe
225                 230                 235                 240
Leu Tyr Pro Ile Val Glu Pro Cys Asp Leu Gln Gly Phe Glu Val Leu
                245                 250                 255
Ser Ile Tyr His Pro Thr Asp Asp Val Ile Asn Ser Val Val Ile Ser
            260                 265                 270
Lys Lys His Pro Val Val Ser Ile Gly Asn Val Gly Gly Pro Asn Ser
        275                 280                 285
Cys Leu Leu Lys Pro Cys Asn Cys Ser Lys Thr His Ala Lys Met Asn
    290                 295                 300
Lys Asn Met Met Ile Glu Glu Phe Gly Ala Arg Glu Glu Gln Leu Ser
305                 310                 315                 320
```

<210> 22
<211> 963
<212> DNA
<213> Arabidopsis thaliana

<400> 22

```
atgggttgcc aagacgaaca attggtgcaa acaatatgcg atctctacga aaagatctca      60
aagcttgaga gtctaaaacc atccgaagat gtcaacattc tcttcaagca gctcgtttcc     120
acatgcatac caccaaaccc taacatcgat gtcaccaaga tgtgtgacag agtccaagag     180
attcgactta atctcatcaa gatttgtggt ctagccgaag gtcacttaga aaaccatttc     240
tcttcgatct tgacctctta ccaagacaac ccacttcatc atttaaacat tttcccttat     300
tacaacaact atttgaaact cggaaagctc gagttcgacc tcctcgaaca aaacctaaat     360
ggctttgtcc caaagagtgt ggctttcatt ggatctggtc ctcttcctct cacttccatc     420
gttcttgctt cattccatct caaagacaca atctttcaca actttgacat cgacccatca     480
gcgaactcac tcgcttctct tctggtttcc tctgatccag acatctctca acgcatgttc     540
ttccacaccg ttgatataat ggacgtgaca gagagcttaa agagctttga tgtcgtgttt     600
ctagctgctc ttgttggaat gaacaaagag gagaaagtta aagtgatcga gcatctgcag     660
aaacacatgg ctcctggtgc tgtgctcatg cttaggagtg ctcatggtcc gagagcgttt     720
ctttatccga tcgttgagcc gtgtgatctt caggggttcg aggttttgtc tatttatcac     780
ccaacagatg atgttatcaa ctccgtggtg atctctaaaa agcatccagt tgtttcaatt     840
gggaatgttg gtggtcctaa ttcatgcttg ctcaagcctt gcaactgttc caagacccac     900
gcgaaaatga acaagaacat gatgatcgag gagttcggag ctagggagga acagttgtct     960
taa                                                                   963
```